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## CALCULUS.

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148. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, Ohio.

Hemholtz's differential equation for the strength of an electric current  $C$  at any time  $t$ , is  $C = E/R - L/R \times dC/dt$ . Solve this equation, supposing  $C=0$  when  $t=0$ ; and  $E, R, L$  are to be regarded as constants.

149. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics in The Temple College, Philadelphia, Pa.

Find the volume contained between the plane  $z = (a-x)\cot\beta$  and the surface  $xz^2 = (a-x)(x^2 + y^2)$ .

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## MECHANICS.

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138. Proposed by W. J. GREENSTREET, M. A., Editor of The Mathematical Gazette, Stroud, Gloucestershire, England.

A smooth elliptical tube is held in the vertical plane with its major axis inclined to the vertical. A particle is projected from the lowest point. Find the pressure on the tube at any point and the condition that the pressure may vanish at the highest point.

139. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, O.

A homogeneous sphere, radius  $r=50$  inches, makes  $m=30$  revolutions around an axis every second. The mass begins to disappear from the surface into space at a rate exactly sufficient to cause the diameter to decrease uniformly at the rate of  $(1/n)$ th  $= 1/1000$ th of a linear inch per second. At what rate per second is the angular velocity of the sphere changing the instant the diameter becomes  $p=10$  inches? What is the diameter of the sphere when the rate of disappearance of matter is midway between minimum and maximum? When is the angular velocity a maximum? How does this maximum angular velocity compare with the original angular velocity? What is the diameter of the sphere when the paracentric force is (1) a maximum and (2) a minimum?

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## DIOPHANTINE ANALYSIS.

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101. Proposed by JOSIAH H. DRUMMOND, LL. D., Portland, Me.

If  $p$  and  $q$  are such values of  $x$  and  $y$  as fulfill the conditions  $x^2 \pm y^2 - 1 = a$  square, find, in terms of  $p$  and  $q$ , the expression for an indefinite number of other values.

102. Proposed by A. H. BELL, Hillsboro, Ill.

Prove that every indeterminate equation of the second degree can be reduced to  $x^2 - Ay^2 = Bz^2$ . [*Legendre.*]

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## AVERAGE AND PROBABILITY.

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123. Proposed by LON C. WALKER, A. M., Professor of Mathematics, Petaluma High School, Petaluma, Cal.

Three points are taken at random within a square. What is the probability that the triangle formed by joining them is acute?